

inundative releases of the nematodes *Steinernema feltiae* or *S. riobrave*. Singly, both mustard and beneficial-nematode application reduced root knot nematode damage to potato tubers and increased marketable tuber yields. However, there was a negative interaction between the two bio-agents such that the combination of these two control options did not further improve suppression of plant-parasitic nematodes. Thus, mustard seed meal applications toxic to the target pest, the root knot nematodes, also disrupted the ability of *Steinernema* spp. to act as a biocontrol agent. *Steinernema* spp. also attacked Colorado potato beetles pupating in the soil. Field and laboratory experiments indicated some disruption of this biological control effect on the beetles following biofumigation. However, potato beetles were less-willing to lay eggs on potato plants grown in mustard amended soil, suggesting a counteracting benefit of mustard application. Our results demonstrate that mustard bio-fumigants have complex non-target effects on the potato food web, with both negative and positive implications for crop production.

Chemotaxis of Phytophthora zoospores to soybean roots is altered by RNAi silencing of isoflavone biosynthesis

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Phytophthora sojae zoospores navigate to the roots of soybean (*Glycine max*) through chemoattraction to substances exuded by the roots. Although the isoflavones, daidzein and genistein, may be primary chemoattractants for *P. sojae*, their roles relative to other potential attractants are unknown. *Agrobacterium rhizogenes* was used to initiate and transform soybean hairy roots with RNAi constructs to silence genes for two different enzymes for isoflavone biosynthesis, isoflavone synthase (IFS) and chalcone reductase (CHR). Excised roots (2 cm long) were placed in the wells of concave microscope slides. *P. sojae* zoospores were introduced, submersing the roots fully. Zoospore movements were monitored until the zoospores encysted. The numbers of zoospores attached to the roots were then recorded, noting the population of zoospores in each of five designated root sections. In control roots the largest number of zoospores attached to a specific zone corresponding to the zone of elongation. In roots containing neither genistein nor daidzein, due to IFS silencing, the zoospores did not attach to the normal root zone, but instead attached to the root cap. In contrast, the number of zoospores attracted to CHR-silenced roots was three times that of control roots, but zoospores were attached along the entire root. Taken together, these results suggest that genistein is a strong chemoattractant for *P. sojae*, but that daidzein may be responsible for the specific targeting of zoospores to the correct root zone. Continued study of mechanisms underlying *P. sojae* zoospore chemotaxis could lead to improvements of disease resistance in soybean and related legumes.

Source of more than 60 years of chemical disease-control data: The publication 'Fungicide and Nematicide Tests', 1945–2006

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Synthetic, organic fungicides were introduced in the mid-1930s. These revolutionized plant disease control, started a wave of product evaluations, and the compilation and exchange of disease-control data. The Potomac Division of APS in 1945, appointed a committee to "undertake the collecting, classifying, summarizing and mimeographing disease-control data generously contributed by pathologists throughout the United States and Canada" (F&N TESTS, vol. 50). In 1960, the word "Nematocide" was included in the title and changed to "Nematicide" in 1969. The 61 volumes of F&N TESTS have been published as supplements to the USDA Plant Disease Reporter, Agricultural Chemicals, privately, and by APS Press. Since the 2000 edition (volume 55), the reports are available electronically in PDF-format at the APS website. In 2007, F&N TESTS and Biological and Cultural Tests were combined into Plant Disease Management Reports. From 1961–2006, approximately 16,000 reports were compiled and published. The initiation, continuation, and growth of F&N TESTS resulted from countless hours contributed by numerous APS members. For most of its existence, F&N TESTS has been guided by an editor, section editors, and the APS New Fungicide and Nematicide Data Committee members. Information in pictorial, graphic, and narrative format describes some of these contributions, the history, and processes used to produce F&N TESTS. This publication may be the single, richest source for information of the development of applied chemical plant-disease control and the individuals and industries that contributed.

High tunnels and grafting for disease management in organic tomato production

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High tunnels are gaining popularity for organic and conventional tomato growers as they may provide season extension, reduced foliar disease incidence (particularly against early blight and *Septoria*), and increased fruit quality. However, crop rotation is often compromised, and soilborne disease can be prevalent in these systems. A research program was initiated to evaluate commercially-available tomato rootstocks capable of reducing soilborne disease incidence and increasing yield under tunnel and field conditions. Soilborne diseases such as bacterial wilt, root-knot nematode, and southern stem blight were effectively managed utilizing various rootstocks in infested field and tunnel soils ($P < 0.05$). An experiment was established at the Center for Environmental Farming Systems (Goldsboro, NC) to compare grafted and non-grafted plants within field and high tunnel production. The systems comparison showed that total fruit yield was higher in the tunnels ($P = 0.01$). Insect damage and tomato spotted wilt virus incidence was higher in the field ($P < 0.05$). In contrast, fruit cracking and catfacing incidence was higher in the tunnel system ($P < 0.05$). The main effect of grafting showed that yields were increased when 'Maxifort' rootstock was used, even under little disease pressure from soilborne pathogens ($P < 0.01$). High tunnels and grafting with resistant rootstock offer complementary roles in an integrated pest management approach for tomato.

Effects of sanitation with a bleach solution on daylily and hosta growth

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Daylilies (*Hemerocallis* spp.) and hostas (*Hosta* spp.) are two of the most popular and economically important herbaceous perennial plants produced in nurseries and planted in landscapes. Both are propagated vegetatively--often by planting dormant rooted crowns. However, soilborne plant pathogens can be present on propagation stock at the time of planting, and these propagules can serve as primary inoculum to initiate disease. Therefore, sanitation of propagation stock prior to planting can be an effective and economical disease management strategy if treatments have no deleterious effects on plant growth. In this study, we evaluated the effects of 10% household bleach solution on growth of Stella d'Oro daylilies and three cultivars of hostas--Albo Marginata, Aureo Marginata, and Wide Brim. Dormant crowns were soaked for 0, 1, 5, and 10 min in bleach solution and then rinsed thoroughly in tap water. Individual crowns were planted in a peat-based container mix in 3-liter pots, and pots were placed outside and randomized. Plants were watered as needed and allowed to grow for 40 to 50 days. Then, foliage from all plants was harvested and weighed; the numbers of flower stalks, flower buds, and flowers on daylily plants were counted at 26 or 28 days. Two trials were conducted with daylilies, and three trials were conducted with hostas. Based on analyses of variance, soaking dormant crowns of daylilies and hostas in 10% bleach solution for 1 to 10 min had no significant effect on the plant growth parameters measured. Consequently, a pre-plant soak in 10% bleach solution could be an effective and economical disease management practice for these two herbaceous perennial crops.

Global analyses of defence gene expression in a model tomato-Verticillium pathosystem

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Relatively little is known about the molecular mechanisms utilized by plants to defend themselves against fungal vascular pathogens. Here, we have used a model tomato-Verticillium pathosystem to compare the global expression of genes in compatible and incompatible interactions. Seedlings of Craigella tomatoes, susceptible or resistant to Verticillium dahliae race 1, were infected by root dipping in conidial suspension. Initially microarray analyses were carried out at one critical time point (10 days post-inoculation) using a commercially available DNA chip (TOM 1). At least 45 genes were significantly down-regulated in resistant relative to susceptible reactions and 88 genes were up-regulated. Of special note was a group of 14 genes forming a distinct scatter plot cluster. For comparison, gene expression in each interaction relative to uninfected control plants also was examined. Based on this and a previous study of a tolerant interaction, 267 genes were selected to make a custom chip for Verticillium-related genes which was used for more detailed comparisons during 4 to 15 days post-inoculation. Three main patterns of change were observed and confirmed by RT-PCR. One group comprised genes which were up-regulated in the resistant interaction relative to the susceptible; their expression correlated with the fungal colonization cycle. In the other two groups the genes were down-regulated in resistant